

① Find the angle(s)

(a) $\sin^{-1}(1)$

90°

(c) $\sin^{-1}(\frac{1}{2})$

$30^\circ, 150^\circ$

(b) $\sin^{-1}(\frac{\sqrt{3}}{2})$

$60^\circ, 120^\circ$

(d) $\sin^{-1}(-\frac{\sqrt{2}}{2})$

$315^\circ, 225^\circ$

② which Δ 's are possible given the side lengths,

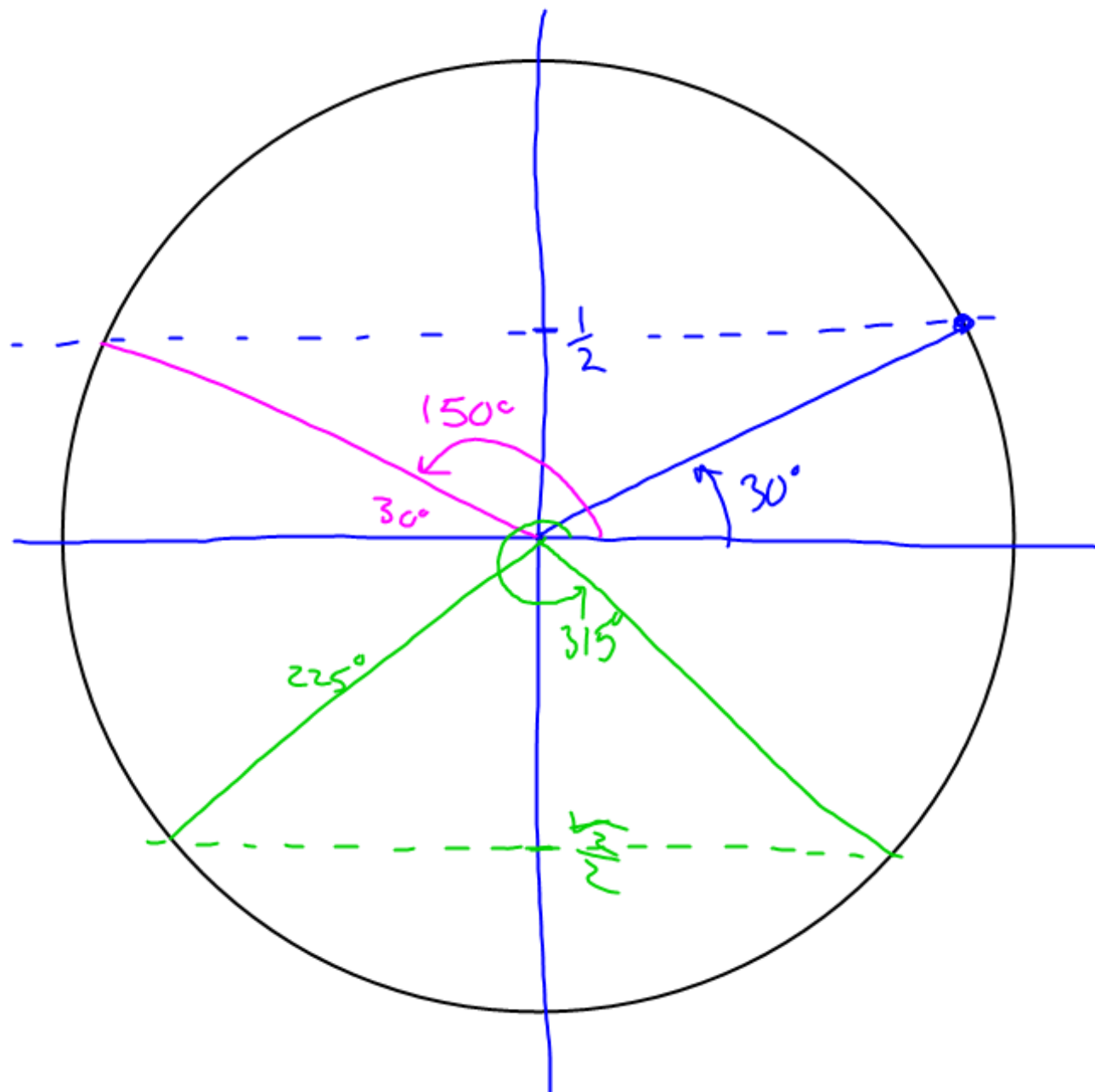
(a) 3cm, 7cm, 8cm

yes

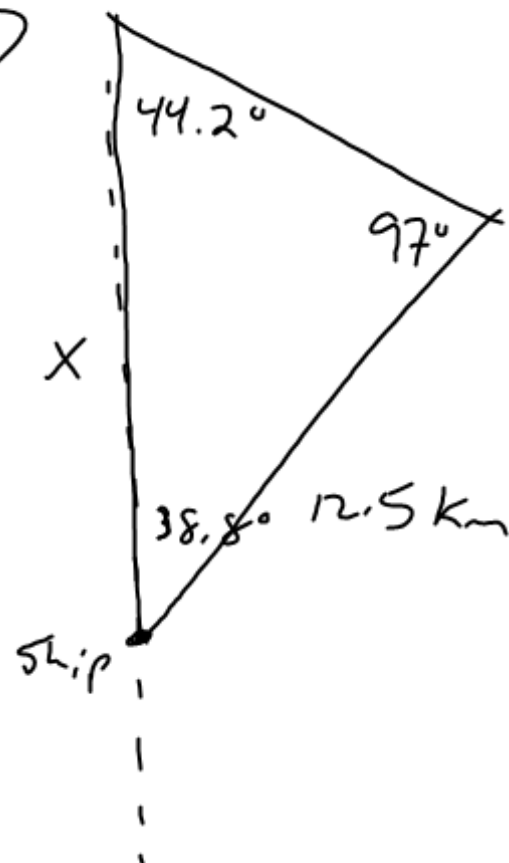
(b) 4cm, 2cm, 7cm

No





(27)

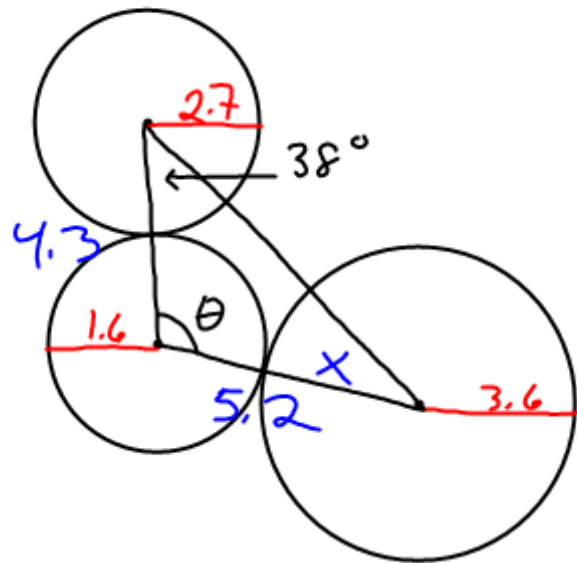


$$\cancel{\sin 97^\circ} \frac{X}{\cancel{\sin 97^\circ}} = \frac{12.5}{\sin 44.2^\circ} \cdot \sin 97^\circ$$

$$X = \sin 97^\circ \cdot \frac{12.5}{\sin 44.2^\circ}$$

$$\underline{\underline{X = 17.80 \text{ km}}}$$

(31)



$$\cancel{4.3} \cdot \frac{\sin X}{4.3} = \frac{\sin 38}{5.2} \cdot 4.3$$

$$\sin X = 4.3 \cdot \frac{\sin 38}{5.2}$$

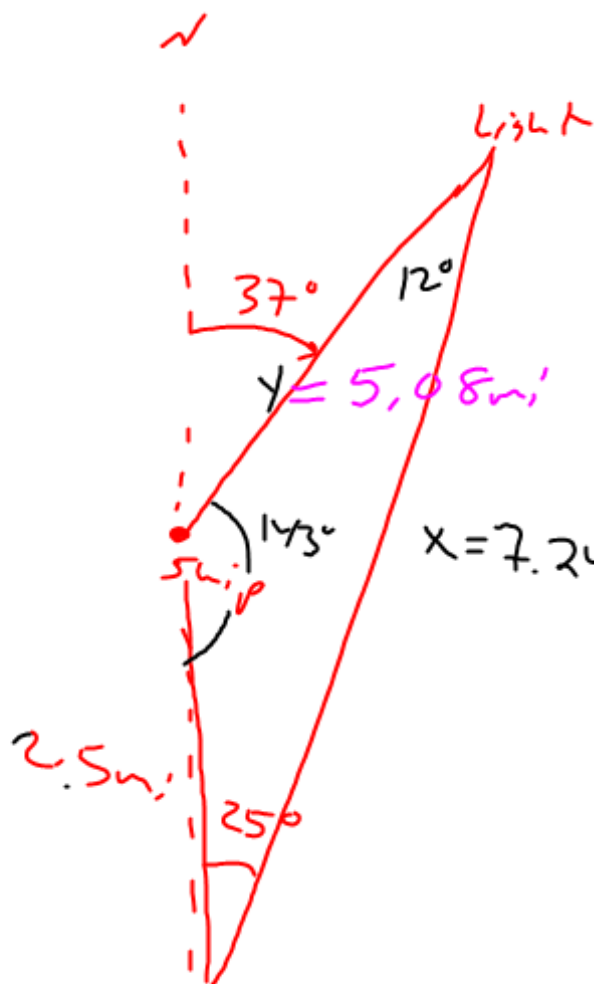
$$X = \sin^{-1} \left(4.3 \cdot \frac{\sin 38}{5.2} \right)$$

$$X \approx 30.6^\circ$$

$$\theta = 180^\circ - 38^\circ - 30.6^\circ$$

$$\theta \approx 111.4^\circ$$

33



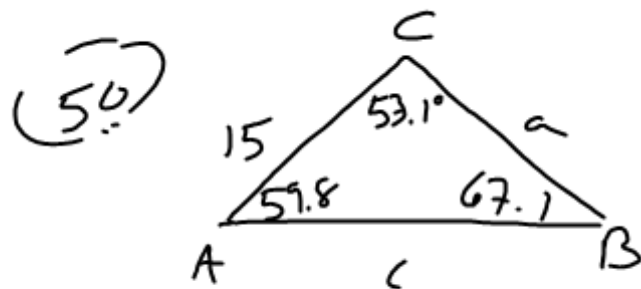
$$\frac{\sin 143^\circ}{\sin 12^\circ} = \frac{2.5}{\sin 143^\circ}$$

$$x = 7.24 \text{ miles}$$

$$\sin 143^\circ \cdot \frac{2.5}{\sin 12^\circ} = x$$

$$\frac{2.5}{\sin 12^\circ} = \frac{y}{\sin 25^\circ}$$

$$y = \sin 25^\circ \cdot \frac{2.5}{\sin 12^\circ}$$



$$\frac{a}{\sin 59.8} = \frac{15}{\sin 67.1}$$

$$a = \sin 59.8 \left(\frac{15}{\sin 67.1} \right)$$

$$a = 14.07$$

$$A = \frac{1}{2} a b \sin C$$

$$A = \frac{1}{2} (14.07)(15) \sin (53.1)$$

$$\underline{A \approx 84.4}$$

SSS

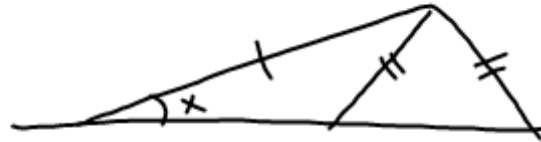
SAS

~~ASS~~

ASA

AAS

~~AAA~~

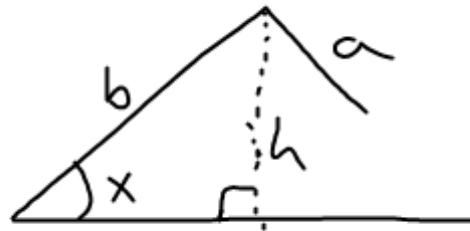


Ambiguous Case

SSA
↓ ↓ ↓
a b x

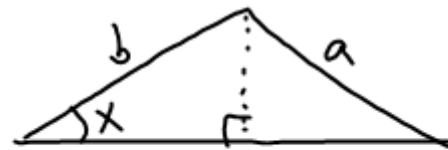
$$\sin X = \frac{h}{b}$$

$$\underline{h = b \sin x}$$



No Triangle

$$a < h$$



1 triangle

$$a \geq h$$



2 Triangles

$$h < a < b$$

$$h = 5.4 \sin 41^\circ$$

$$h \approx 3.54$$

Ex $a = 3.3$
 $b = 5.4$

$$x = 41^\circ$$

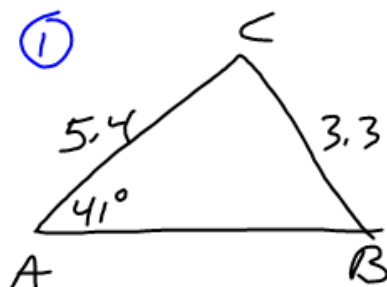
how many Δ 's
No Δ

$$A = 41^\circ$$

①

$$a = 3.3$$

$$b = 5.4$$



$$\textcircled{2} \quad \frac{\sin 41^\circ}{3.3} = \frac{\sin B}{5.4}$$

$$\sin B = 5.4 \cdot \frac{\sin(41^\circ)}{3.3}$$

③

$$B = \sin^{-1} \left(5.4 \frac{\sin 41^\circ}{3.3} \right)$$

$$B \approx \text{Error}$$

Steps

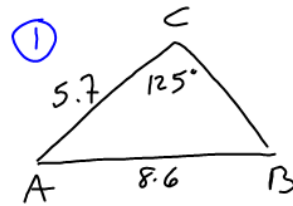
- ① Draw a triangle with given info
- ② Use Law of sines to find missing angle
- ③ When taking the inverse sine, find both possible angles (the one the calc gives and 180° minus that angle)

\Rightarrow Error means
No triangle

$$b = 5.7$$

$$c = 8.6$$

$$C = 125^\circ$$



$$\textcircled{2} \quad \frac{\sin 125^\circ}{8.6} = \frac{\sin B}{5.7}$$

$$\sin B = 5.7 \cdot \frac{\sin 125^\circ}{8.6}$$

$$\textcircled{3} \quad B = \sin^{-1}\left(5.7 \cdot \frac{\sin 125^\circ}{8.6}\right)$$

$$B = \underline{32.9^\circ} \text{ or } 180 - 32.9 = \underline{147.1^\circ}$$

$$\textcircled{4} \quad \begin{array}{ccccccc} 180^\circ & - & 125^\circ & - & 32.9^\circ & = & 22.1^\circ \\ \downarrow & & \downarrow & & \downarrow & & \downarrow \\ \text{total in} & & \text{given} & & \text{found} & & \text{3rd} \\ \text{a } \triangle & & \text{angle} & & \text{angle} & & \text{Angle} \\ \uparrow & & \uparrow & & \uparrow & & \uparrow \\ 180^\circ & - & 125^\circ & - & 147.1 & = & -92.1 \end{array}$$

Steps

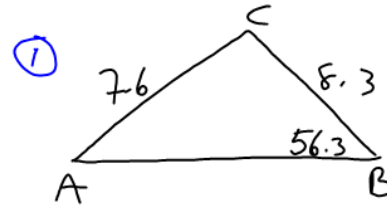
- ① Draw a triangle with given info
- ② Use Law of Sines to find missing angle
- ③ When taking the inverse sine, find both possible angles (the one the calc gives and 180° minus that angle)
- ④ Take 180 minus given angle then minus your found angle to find 3rd angle in the \triangle

\Rightarrow if only one positive,
it means only 1 \triangle

$$a = 8.3$$

$$b = 7.6$$

$$B = 56.3^\circ$$



$$\textcircled{2} \quad \frac{\sin 56.3}{7.6} = \frac{\sin A}{8.3}$$

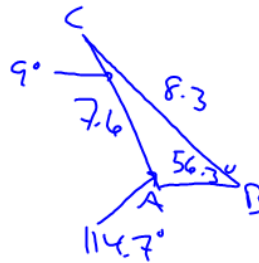
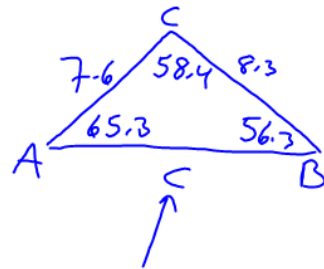
$$\sin A = 8.3 \cdot \frac{\sin 56.3}{7.6}$$

$$A = \sin^{-1} \left(8.3 \cdot \frac{\sin 56.3}{7.6} \right)$$

$$\textcircled{3} \quad A \approx 65.3^\circ \text{ or } 114.7^\circ$$

$$\textcircled{4} \quad 180 - 56.3 - 65.3 = \underline{58.4^\circ}$$

$$180 - 56.3 - 114.7 = \underline{9^\circ}$$



Steps

- ① Draw a triangle with given info
- ② Use Law of Sines to find missing angle
- ③ When taking the inverse sine, find both possible angles (the one the calc gives and 180° minus that angle)
- ④ Take 180 minus given angle then minus your found angle to find 3rd angle in the \triangle

\Rightarrow If both are positive, we have 2 \triangle 's

- Write up due Thurs.
- Sect. 7.2 #1, 2, 5-23(10), 31, 35